WHITE PAPER

Migrating Business-Critical Applications from UNIX to Windows and Itanium® 2-Based Servers

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Executive Summary

Despite the growing capabilities offered by Intel and Microsoft for enterprise computing environments, many customers are unaware of the value that Intel® Itanium® 2 processor-based systems running Windows Server offer over UNIX infrastructures for hosting critical workloads. To illustrate the motivating factors that led enterprise companies to choose this open standards-based solution over the proprietary UNIX architecture, Ideas International (IDEAS) conducted a study of real-world business cases. The participating enterprises expressed a multitude of reasons for migrating to Windows Server on Itanium 2-based servers. They were attracted to Windows Server due to the ability to leverage their existing desktop skill sets across a broader range of applications, and perceived that their software costs would be reduced. The Itanium 2-based platform was appealing to these users because it offered maximum scalability for Windows Server workloads, and was perceived as having a long-term future with much room for innovation and improvement.

CONCLUSIONS

- Windows Server and Itanium 2 are a viable option for migrating business-critical workloads currently running on UNIX.
- Interoperability between UNIX and Windows does not present major difficulties for users who migrate from one platform to the other.
- Users have had positive experiences with the reliability of Windows Server, and feel confident that Itanium 2 processor-based systems will continue to deliver high levels of reliability over time.
- The Itanium 2-based platform offers maximum scalability for Windows Server workloads, and has a long-term future with much room for innovation and improvement.
- Migrating to Windows Server and Itanium can help to reduce costs due to lower hardware expenses and manageability improvements gained by standardizing on one operating system.

The studied users had positive experiences with the reliability of the Windows Server platform, and agreed that reliability has improved dramatically in Windows Server 2003 over earlier releases. They also felt confident that Itanium 2 processor-based systems would continue to deliver high levels of reliability over time due to ongoing system vendor innovations. Scalability was also a key concern for users who deployed Windows Server on Itanium 2-based servers, and in general, they have been satisfied with the achieved results. Most of the studied users established that Itanium 2-based systems running Windows Server would meet their performance needs by conducting benchmark

tests based on their own workloads with specific goals. In all cases, the users were satisfied that the goals were being met.

Although UNIX and Windows Server are fundamentally different operating systems in many ways, interoperability between the two systems did not present major difficulties for the users who had migrated from one to the other, especially when their workloads were based on third-party software that supports multiple platforms. Financial considerations are often a key factor in driving the migration from UNIX to Windows Server, and indeed, users who have completed the migration have identified cost benefits as a result. Some savings might be apparent at the time of acquisition due to lower hardware costs deriving from the use of industry-standard processors, while other savings might be "softer," resulting from manageability improvements gained by standardizing on one operating system. The combination of Windows Server and Itanium 2-based servers clearly opens up compelling avenues for users to simplify their infrastructure by consolidating and reducing the number of operating systems and hardware platforms that they have to manage. By simplifying their environment, users reduce their operation costs. Simplification also makes the environment much easier to integrate, and thus much more responsive to business-processing needs.

Introduction

The emergence of service-driven application development with enterprise applications, and the need to couple applications with business rules and logic so that they better enable integration and drive faster and more agile processes, requires a powerful and flexible platform for running core business applications. While historically, the most demanding commercial computing applications were reserved for proprietary mainframe systems, in modern enterprise IT environments, the most critical workloads are now routinely hosted on RISC-based servers running the UNIX operating system. Over the years, UNIX systems have matured sufficiently to meet the functional requirements of the highest-end environments.

However, because most of the leading UNIX operating systems are tied to specific lines of server hardware, many users of these systems are finding that their limited deployment options are becoming increasingly burdensome. In some cases, users find themselves locked into expensive hardware or software, with performance sometimes trailing behind the industry curve. Also, faced with the fluid business models of some leading UNIX vendors, and in some cases a shrinking base of Independent Software Vendors (ISVs) and Independent Hardware Vendors (IHVs), users may question the commitment of their vendors to the UNIX operating system. These circumstances are causing many UNIX users to consider migrating to a more stable, standards-based platform that promises longevity and growth in a more manageable and cost-conscious envelope.

At the same time, the capabilities of industry-standard platforms have increased significantly in recent years. Microsoft's Windows Server operating system and servers using Intel's high-end processors have progressed to the point at which they can now satisfy the most demanding needs in terms of scalability and reliability. As a result, users in enterprise and datacenter environments have the

option of benefiting from volume price points and a choice of hardware suppliers enabled by industry-standard platforms without compromising on performance or uptime.

Intel and Microsoft Take Enterprise Capabilities to the Next Level

With the delivery of Windows Server 2003, Microsoft has made considerable progress in addressing the scalability and reliability needs of enterprise environments and datacenters with its operating system platform. Windows Server 2003 introduced a number of functions that are critical for enabling applications to scale up, including full 64-bit support; improved Shared-Memory Multiprocessing (SMP) scalability, with the ability to support up to 64 processors; support for Non-Uniform Memory Access (NUMA) systems; and a variety of other improvements such as a kernel-level cache and applications pools, which allow key applications to be assigned to groups of processors in SMP systems. Windows Server 2003 also introduced major improvements that increased the dependability of the Windows Server platform, including a variety of enhancements related to system robustness, security, operational robustness, workload management, and High-Availability (HA) clustering, all of which should help to boost uptime. Operational robustness has been improved with more online management functions, added online backup support, and more support for online hardware reconfiguration.

Meanwhile, Intel has dramatically increased the capabilities available on industry-standard hardware with its Intel® Itanium® processor family. Intel has designed its Itanium processors to vigorously compete with the best of the RISC processors for 64-bit computing, both in performance and with built-in resilience to failures. The IA-64 processor architecture used in Intel Itanium processors is based on Explicitly Parallel Instruction Computing (EPIC), which breaks new ground in terms of performance-enhancing optimizations. Many of these optimizations, including predication, speculation, large numbers of registers, and others, had not been available to the same extent in previous-generation RISC designs. More importantly, these optimizations generally benefit traditionally designed (i.e., single-threaded) applications, and do not require developers to restructure their code for multithreaded execution. Rather, the IA-64 compilers automatically identify opportunities for optimization. The newest implementation of IA-64, the Itanium 2 processor, introduces several enhancements over earlier implementations, including 50% larger Level 3 (L3) caches and increased processing frequency. These improvements significantly strengthen the Itanium 2 processor's qualifications for core business applications such as Business Intelligence (BI), Enterprise Resource Planning (ERP), Supply Chain Management (SCM), and database processing. The effectiveness of these optimizations has been proven on a variety of industry-standard benchmarks. For example, on the TPC-C test measuring database performance, Itanium 2-based systems running Windows Server 2003 now hold the number 3 and number 8 positions on the list of the top ten highest results.[1] A Windows Server system with 32 Itanium processors achieved record performance on the TPC-H test that measures decision-support

[1] As of January 16, 2006. See the Transaction Processing Performance Council's Top Ten TPC-C results by Performance (Version 5) at http://www.tpc.org/tpcc/results/tpcc_perf_results.asp.

performance.[2] Windows Server on Itanium 2-based systems also excels on benchmarks measuring the performance of specific applications such as SAP, on which a Windows Server system with 64 Itanium processors was able to support 93,000 concurrent users.[3]

Mainframe-Grade Reliability in Itanium-Based Platforms

Further, while the Intel Itanium processor may be most identified with enabling 64-bit computing and strong performance due to its next-generation microarchitecture, it is sometimes overlooked that the Itanium-based platform also adds significant value with advanced features enabling Reliability, Availability, and Serviceability (RAS). In particular, the Itanium-based platform has extensive support for allowing processors to continue running in the event of a single-bit "soft error," a common occurrence that is usually due to circumstances well outside of an operator's control, such as atmospheric radiation. Mainframes have long employed mechanisms to continue operating in the event of such corruptions, and the Itanium processor now uses similar techniques to protect against single-bit failures. Presently, the Itanium processor's large L3 caches are protected by an Error Correcting Code (ECC) that can repair soft errors resulting from a corrupted bit. Intel's upcoming processor, codenamed "Montecito", will add what Intel calls Pellston technology, which allows malfunctioning sections of cache to be disabled.

Montecito will also include Demand-Based Switching (DBS) technology, which slows down clock rates during lull periods to conserve power. In addition to saving power costs, DBS will help the dual-core Montecito stay cooler to improve circuit reliability. Beyond DBS, Montecito processors will have reduced power requirements compared to previous generations. Intel also indicates that it has built in a number of additional error checking features as part of ongoing enhancements to the Intel Itanium platform's Machine Check Architecture (MCA). Although the specific details of MCA enhancements have not been completely revealed yet, Intel did report that it had subjected Montecito to a bombardment of gamma rays and alpha particles during testing of soft error recovery at a national laboratory. That accelerated stress testing indicated that individual chips had an average time between failures in the hundreds of years. When coupled with the reliability enhancements in Windows Server 2003, these functions will enable unprecedented levels of uptime for Windows Server-based workloads.

Ready for Virtualization

Both Microsoft and Intel are pursuing virtualization in their respective platforms. A number of functions in Windows Server and the Itanium 2-based platform enable users to achieve the benefits of virtualization. These virtualization benefits – including maximum utilization of existing resources, and the ability to perform IT

[2] As of January 16, 2006. See the Transaction Processing Performance Council's Top Ten TPC-H by Performance (Version 2) at http://www.tpc.org/tpch/results/tpch_perf_results.asp.

[3] See SAP Certification Nr. 2005045 (http://www50.sap.com/benchmarkdata/sd3tier.asp). SAP Release: SAP ECC5.0 | Software Release on DB Server: Windows Server 2003 DC, SQL Server 2005 | Test Date: 10/27/2005 | Concurrent SAP SD Standard Benchmark Users: 93,000 | Hardware: HP Integrity Superdome 64P Server, 64 processors / 64 cores / 64 threads, Intel Itanium 2, 1.6 GHz, 36 KB L1 cache, 256 KB L2 cache, 9 MB L3 cache, 256 GB RAM.

operations with far better economies of scale – allow infrastructures to be managed efficiently even as they undergo high rates of growth.

Windows Server 2003 supports several virtualization functions. These include:

- *Windows System Resource Manager (WSRM),* a tool that allows administrators to set allocation policies for applications. These policies regulate an application's access to CPU and memory resources.
- *Partition support*, which allows administrators to run multiple instances of the Windows Server operating system on appropriately equipped servers. Each instance of the operating system behaves as if it were running on a standalone machine and is electrically isolated from other instances.
- *Virtual machine support in the Virtual Server 2005 option,* which involves creating an entire computer system in software. Managers can host multiple virtual computers on a single physical server and precisely control the resources that are assigned to each system.

Microsoft has also taken significant steps to restructure the pricing of its products in order to accommodate usage in virtualized environments. In particular, Microsoft now licenses Windows Server based on the number of virtual processors being used, rather than for all of the physical processors on the server. Customers can run up to four instances of Windows Server 2003 Enterprise Edition on a single Itanium-based host at no extra charge.

Intel is also meeting some virtualization requirements at the hardware level with Itanium-based platforms. Currently, Intel plans to introduce a dual-core processing technology in its Montecito processor release. Montecito moves to a 90 nm fabrication technology from the 130 nm process of the current Madison implementation. The smaller transistor sizes allow the Montecito chip to have 1.72 billion transistors compared to the 592 million transistors of the Madison 9M implementation. As a result, Intel can place two full Intel Itanium 2 processor cores on each chip as well as increase the L3 cache size to 24 MB per core. Furthermore, Intel has indicated Montecito will offer a form of multithreading, allowing each core to concurrently execute instructions from two different code threads. These functions will significantly increase the flexibility with which CPU resources can be assigned to workloads on Itanium-based systems.

Industry Commitment to the Itanium 2-Based Platform

A number of leading systems vendors have made major commitments to Itanium 2-based solutions, including Bull, Fujitsu, Hitachi, Hewlett Packard, NEC, SGI, Siemens, and Unisys. Many of these vendors are investing in driving Itanium-based systems into roles for hosting the most critical workloads in the industry, including some deriving from mainframe platforms. The users of these kinds of systems place an extraordinarily high priority on stability, and they have expressed the expectation that the Intel Itanium processor-based platform be supported across the industry for a long time. With greater volumes, and more vendors supporting it, the Itanium 2-based platform thus offers an attractive alternative to competing RISC processors for hosting critical and enduring workloads.

Customer Experiences

Intel and Microsoft have clearly proven their ability to deliver significant IT and business value with consistently better price/performance, improved manageability, and broader availability, giving customers the flexibility to deploy their OEM/ISV/IHV platform of choice. There are now fewer technical objections than ever against using Windows Server and Itanium-based systems rather than UNIX. But despite the growing capabilities offered by Intel and Microsoft for enterprise computing environments, many customers are unaware of the value that Itanium-based systems running Windows Server offer over UNIX infrastructures for hosting critical workloads. To better understand the factors that motivate users to consider that alternative, IDEAS studied some real-world cases in which users adopted Windows Server and the Itanium 2-based platform for workloads that might otherwise have been hosted on UNIX.

As part of this effort, IDEAS conducted in-depth discussions with several users who deployed Windows Server on Itanium 2-based servers for critical workloads. The following are the profiles of these users:

- *Customer A* manufactures and distributes electronic parts for the automotive industry. It migrated an ERP system based on Baan from Sun systems to Windows Server on Itanium-based systems. As part of the project, the company migrated an Oracle database to Windows Server running on a Unisys ES7000 Model 410. The application itself was migrated simultaneously from Solaris to Windows Server on 32-bit Xeon systems.
- *Customer B* is a utility company providing electricity services. It has deployed an SAP R3 system for meter reading management, billing, and customer care on HP Integrity servers, including two four-way RX4620s and an eight-way RX7620.
- *Customer C* is a community college that serves more than 100,000 students in a major U.S. city. It is implementing its new student management system using Windows Server running on HP Integrity servers.

Motivations for Switching to Windows Server and the Itanium 2-Based Platform

The studied users expressed a variety of motivations for migrating to Windows Server on Itanium-based servers. They were attracted to Windows Server by the opportunity to leverage their skill sets across a broader range of applications, and perceived that their software costs would be reduced. The Itanium 2-based platform was appealing because it offered maximum scalability for Windows Server workloads, and was perceived as having a long-term future with much room for innovation and improvement.

Customer A. Customer A's primary consideration for migrating was the fact that its six-year-old Sun systems had reached the end of their lifecycle. The Sun Fire 3500 systems were running too slow, and users could not get information out quick enough. Because of additional functionality that had been added to the systems over the years, the systems were not performing very well when users extracted critical financial information, and other types of reports were taking a long time to produce as well. From a technical standpoint, the direct-attached storage used for the database on the Sun servers had reached its capacity. From a business standpoint, the company was planning to grow through acquisition, and as it added

more companies, more data and processing was going to be needed. Thus, there was a need to take some action: either acquire bigger, faster Sun servers, or switch to a Windows Server system.

Most of the skill sets in Customer A's IT organization were Windows Server-centric, and the company wanted to leverage the Windows Server skill sets that it already had in place. If the company simply acquired a bigger UNIX system to match its growth through acquisition, then it would have to grow the IT department as well to support UNIX (i.e., hire more people to support those bigger, faster UNIX based systems). Instead, the company tried to leverage its available Windows Server skill sets to reduce the total cost of operation (TCO) in its IT department. The company concluded that moving to a system based on the Intel architecture and Windows Server would cost less. The Itanium-based systems cost about a third less to purchase than a new UNIX system, and also promised some savings relative to maintenance and support contracts.

Customer B. Customer B made a strategic decision to adopt Microsoft's products more broadly across its organization. The company moved away from a legacy Novell NetWare system; deployed Active Directory; upgraded its PC fleet to Windows 2000; and migrated its e-mail system to Exchange. Consequently, the company decided to make Windows Server the default platform. Cost considerations were taken into account as well, because the Windows Server platform was perceived to carry a lower cost relative to the company's existing midrange systems. Skill sets also came into consideration for unifying the platform around Windows Server. In the mid-90s, Customer B had a very heterogeneous environment, with a large number of applications running many different kinds of hardware platforms and database systems. The company is now trying to reduce the complexity of its environment by standardizing as much as possible on a single common platform.

Customer B's decision to move to Itanium 2-based servers was primarily driven by a need for scalability. Having had implemented SAP for five to six years with eight production landscapes, including various models of SAP and its components, everything was hosted on Windows Server. Customer B's production systems were running well on an eight-way Intel® Xeon® processor-based server, but the company was concerned that it did not have sufficient headroom for growth. Anticipating significant increases in its customer base and the adoption of new functionality, Customer B decided that it needed to move to a better-performing platform. It wanted to remain on Windows Server and SQL Server, and had no interest in a completely heterogeneous migration. Thus, the logical choice was moving to an Itanium-based platform. Customer B also felt that an Itanium-based platform was better designed for availability than commodity servers based on x86 processors.

Customer C. Customer C's decision to adopt Windows Server was primarily driven by the cost of software. It faced the deployment of a large database server, and did not want to incur the multimillion-dollar cost of buying Oracle. In negotiations with Microsoft, the college found that it could acquire SQL Server licenses for much less; since SQL Server does not run on UNIX systems, the college needed to deploy Windows Server. Customer C chose Itanium 2-based servers because it decided that if it was going to go with the Windows Server platform, it wanted to go

with a hardware architecture that was not at the end of its research and development cycle, and thus had the potential to be improved upon. The college felt that the existing x86 and RISC architectures were reaching the stage of diminishing returns in terms of their development. By contrast, the Intel Itanium microarchitecture was based on a new paradigm that had not yet reached its full potential in terms of functionality and performance.

Reliability Experiences

The studied users generally had positive experiences with the reliability of the Windows Server platform, and agreed that reliability has improved dramatically in Windows Server 2003 over earlier releases. They also felt confident that Itanium-based systems would be able to deliver high levels of reliability over time due to ongoing system supplier innovations.

Customer A initially had misgivings about the reliability of Windows Server. It had been involved with different versions of Microsoft products over the years, and would not have chosen Windows Server for business-critical applications before the release of Windows Server 2003. However, Customer A heard good things about the stability of that release, and decided to see if it was reliable enough in order to reduce costs (by leveraging the existing Windows Server skill sets within the company). Customer A felt that using Windows Server 2003 Datacenter would provide insurance against downtime because its drivers would be certified as more solid than those of other Windows Server platforms. In the end, Windows Server for the most part exceeded the company's reliability expectations. Since the system was cut over in September 2004, there has been no unplanned downtime.

Customer B also found that Windows Server reliability has continuously improved over the years, from Windows NT 4.0 to Windows 2000 to Windows Server 2003. It found that the newest release of Windows Server 2003 is more stable than earlier releases, and fully meets the company's demands for uptime. Customer C concluded that Windows Server systems would meet its reliability requirements based on analysis of documentation from its system vendor, and the vendor's projection for reliability enhancements in the future. Based on the strategic road map that the system provider showed for enabling reliability in future Itanium-based systems, Customer C was convinced that the reliability and the support from the vendors would be where the college needed it to be over time, particularly since the Intel Itanium architecture had not reached the end of its development lifecycle. These projections supported Customer C's conclusion that an Itanium-based platform was the right strategic choice.

Scalability Experiences

Scalability was a key concern for users who deployed Windows Server on Itanium-based servers, and generally, they have been satisfied with the results they have achieved. Most of the studied users established that Windows Server on an Itanium-based platform would meet their performance needs by running benchmark tests based on their own workloads with specific goals. In all cases, the users were satisfied that the goals were being met.

Customer A was most concerned as to whether its Oracle database would perform as well on a Windows Server systems as it did on a 64-bit Sun system. To make

sure it would get the highest levels of performance on Windows Server, Customer A chose to deploy the Datacenter Edition of Windows Server 2003 on the Intel Itanium architecture. Indeed, the company saw huge performance gains after moving from the Sun system to the Itanium 2-based system. Statistics for the timing of different ERP jobs showed that a planning job that used to take 18 hours to run on the Sun system now ran in 1.75 hours, which is almost a 400% gain.

Customer B expected to boost its performance by upgrading from 32-bit computing to 64-bit computing and benefiting from the larger memory ranges that would be enabled. That turned out to be the case as well in the end, when the resulting performance exceeded the company's expectations. Customer B quantified scalability in terms of application performance and business metrics. Since it is a utility company, one of Customer B's key metrics involves bill production and bill printing. A typical run involves printing 60,000 to 120,000 electricity bills per night, a task that must be completed within an eight-hour window. Customer B prefers to complete the task in four to five hours, and with Windows Server on Itanium 2-based servers, the company has been able to achieve that goal comfortably.

Customer C performed extensive benchmark testing to prove the scalability of Windows Server on Itanium 2-based servers. It worked closely with its system vendor, focusing on the performance of Peoplesoft, and concluded that the college would achieve the necessary levels of performance on that application. Customer C's analysis centered on the SMP capabilities made possible by the Intel Itanium architecture; the fact that eight-way Itanium 2-based servers can support very large-scale database instances for applications like Peoplesoft was a major factor that persuaded the college to adopt this technology. Customer C was also impressed with ability of Itanium 2-based systems to interface with the external storage devices that it was considering.

Interoperability Considerations

Although UNIX and Windows Server are fundamentally different operating systems in many ways, interoperability between the two systems did not present major difficulties for the users who had migrated from one to the other, especially when their workloads were based on third-party software that supports multiple platforms.

Indeed, many UNIX administrators also have some Windows Server skill sets. In fact, in organizations such as Customer A's, the predominant skill sets are based on Windows Server. In Customer A's case, the administrators had merely maintained some UNIX skills in order to take care of the UNIX side as well. After the migration from UNIX to Windows Server, these administrators required no retraining at all. They were already maintaining a lot of other Windows systems, and were even managing Oracle on some of the other Windows Server systems.

Customer A was particularly impressed with the consistent experience of running Oracle on UNIX and Windows Server platforms. According to Oracle, 80% of the code in its database server is the same on all platforms on which it is hosted. Customer A found that it took a little bit of tuning to achieve the levels of performance the company required, but the process did not involve a lot of effort. More importantly, the skill sets of its database administrators (DBAs) translated very well to the Windows Server platform. Some tools were slightly different, but

the management tools that they used to configure the database and provide for the care and feeding of applications were the same as the ones they had used when the database was hosted on UNIX. The interface that they used to manage Oracle on the UNIX system was accessed identically through their Windows desktop.

Managing user IDs on Windows Server rather than on UNIX is not necessarily an issue either, since these IDs are often handled at the application level. For example, in Customer A's environment, the Baan application controls the user IDs, and the administrators just changed them to be the same as the Windows Server IDs during the migration. Users previously had two different login IDs, one for Windows Server and one for UNIX. Now they have only one login ID, which is used to log in to Windows Server and provides access to all activities. The ID is passed straight through to Baan, which then manages its own IDs and those in Oracle.

Cost Perceptions with Migrating to Windows Server

Financial considerations are often a key factor in driving the migration to Windows Server, and indeed, users who completed the migration have identified cost benefits as a result. Some savings might be apparent at the time of acquisition due to lower hardware costs deriving from the use of industry-standard processors, while other savings might be "softer," resulting from manageability improvements gained by standardizing on one operating system.

For example, Customer A determined that the cost of acquiring one 64-bit Itanium 2-based system together with one 32-bit system that was partitioned into two servers cost $250,000 less than an equivalent solution from Sun. In addition, Customer A concluded that it had lowered its cost of ownership after the migration. Based on the maintenance cost that Sun had quoted over five years for its systems, and the features and services Unisys provided for five years on its systems, Customer A saved another $250,000. Further, the company would have had to hire two or three more UNIX-based administrators because it was growing so rapidly through acquisition, which would have incurred another $250,000 per year. Instead, with the Windows Server solution, Customer A was able to leverage the capabilities of its existing Windows Server administrators to handle the growth.

Other users also perceived manageability benefits that had a favorable impact on TCO, although it was not always precisely quantifiable. For example, on the application side, UNIX servers had often introduced operational details that had to be accounted for on Windows desktops, such as printing or application configuration (i.e., vestiges of UNIX "culture" that users had to deal with even though they were running on a Windows desktop). After switching over to Windows Server-based versions of these applications and database systems, these users found that the integration between desktop and server was considerably cleaner, simplifying the task of configuring the applications and making changes to the database. Customer C also found a significant benefit resulting from manageability after moving to Windows Server. Its patch management procedures and support model became more streamlined, and the ability to use a consistent set of tools across all of its systems reduced the complexity of managing them.

Summary of Migration Factors

The studied users reported that they still encounter considerable biases advocating that mission-critical systems should be kept on non-Intel systems and that Windows Server is only suitable for file- and print-sharing. This perception arose because over the years, either Intel systems were not considered reliable hardware or Windows Server was not considered to be reliable enough as an operating system (as it continually had to be rebooted or incurred memory leaks). As a result, the mindset that Intel and Windows Server are not qualified for enterprise workloads may be tough to dispel.

However, the consensus is that over the past two years, the industry-standard platform based on Intel hardware and Microsoft's operating system has become much more stable, reliable, scalable, and secure than ever before. Clearly, the studied users have succeeded in hosting business-critical workloads on Windows Server and Itanium 2-based servers, which would have required UNIX or some other platform in the past.

Recommendations

- If an organization has mixed Windows Server and UNIX skill sets, determine whether it is practical to extend the Windows Server skills across a broader range of applications. Assess the impact on operational costs of expanding UNIX skill sets versus leveraging existing Windows Server skill sets.
- As UNIX systems near the end of their lifecycle, compare the cost of acquiring new UNIX systems with equivalently configured Itanium 2-based systems capable of running Windows Server. Include the cost of maintenance of Itanium 2-based systems versus RISC systems, as well as the potential cost tradeoffs between leveraging Windows Server management skills versus acquiring additional UNIX skills. If appropriate, also consider the licensing cost tradeoffs between a UNIX-based database and SQL server.
- If workloads are based on cross-platform middleware, database, or application software, determine the level of support for that software across UNIX and Windows Server. Choose a business-driven performance metric for the workloads that are considered for migration, and if possible, measure the performance of the third-party software on Windows Server and Itanium 2-based servers against that metric.
- Determine acceptable ranges of downtime, both planned on unplanned, for the workloads that will be migrated to Windows Server. Consider the impact of RAS features in Itanium-based platforms, the use of the Datacenter Edition of Windows Server 2003, and High Availability (HA) cluster add-ons to make sure that the availability of Windows Server-based workloads falls within acceptable parameters.

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